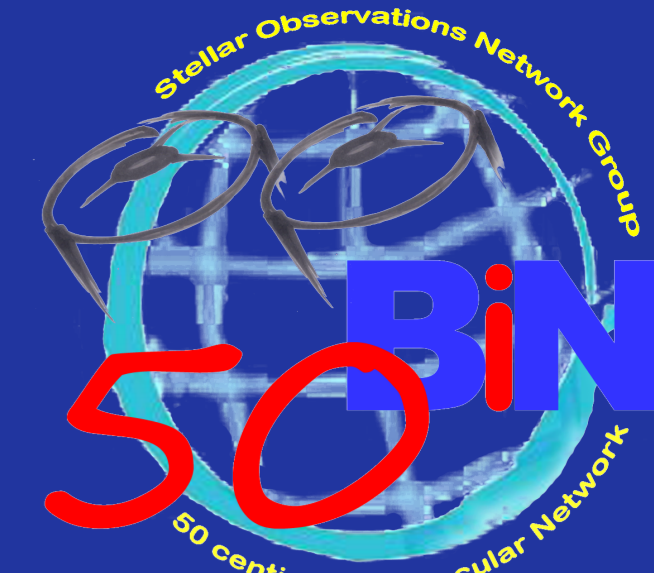


Revisiting the Milky Way Open Clusters with 50BiN



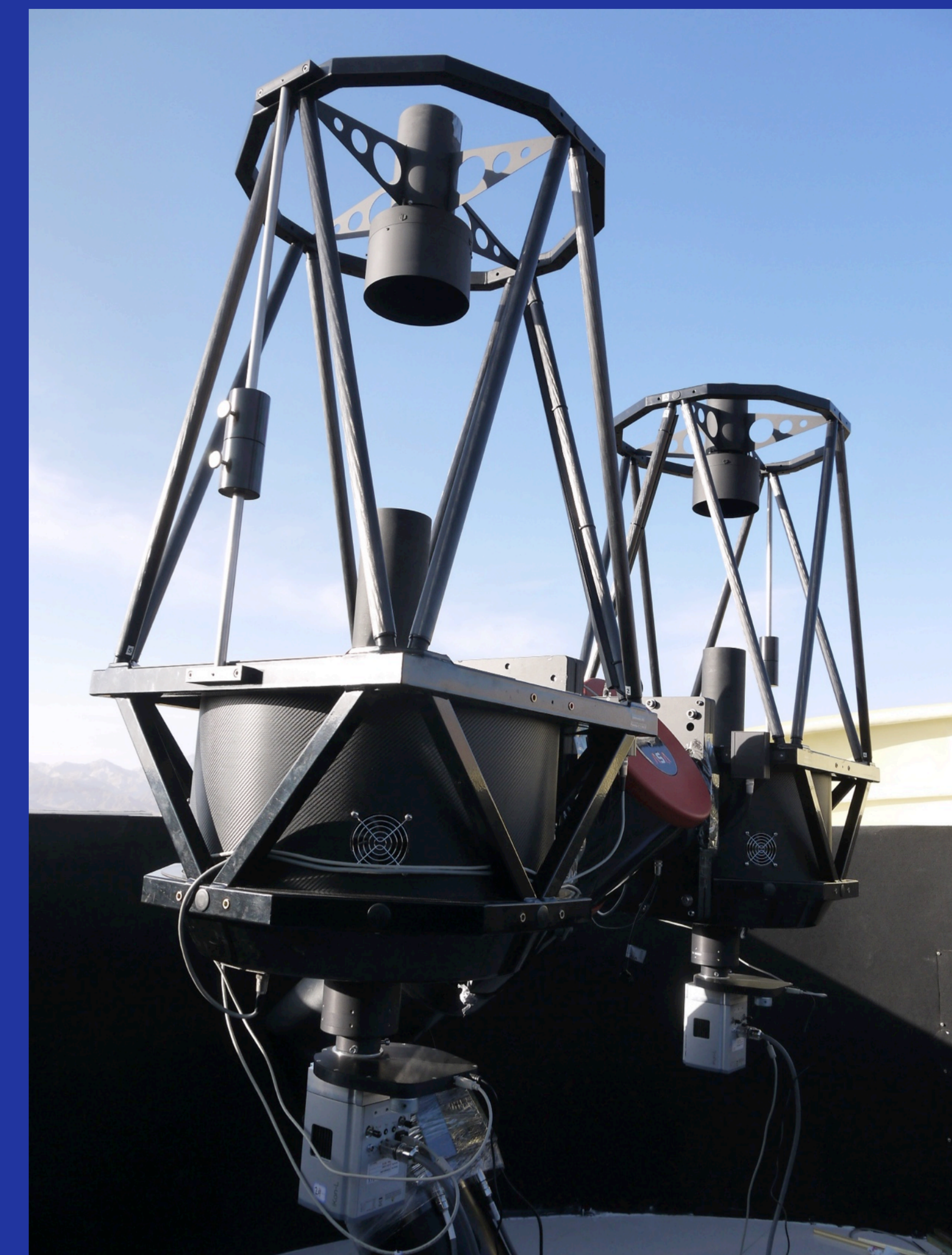
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50BiN (50 centimeter Binocular Network) is a Chinese initiative originated from common research interests of the whole stellar physics community in the country, and China is going to fund the system as an add-on project of Chinese participation of SONG (Stellar Observation Network Group). We are obliged to any suggestions and contributions to 50BiN in terms of scientific provisions. Any type of participation in the program will be highly appreciated. Given the condition that 50BiN is going to share the infrastructure and network of SONG, a number of science goals matching all the goals of the SONG can be pre-defined. The plan is to have a small photometry telescope installed at every SONG node site in the north, so that photometry for a selection of objects can be followed also in the same long time based line and duty cycle as SONG.

Primary scientific goals

A long time-baseline high duty cycle photometry of large FOV will be offered by 50BiN, which allows researches in the following:

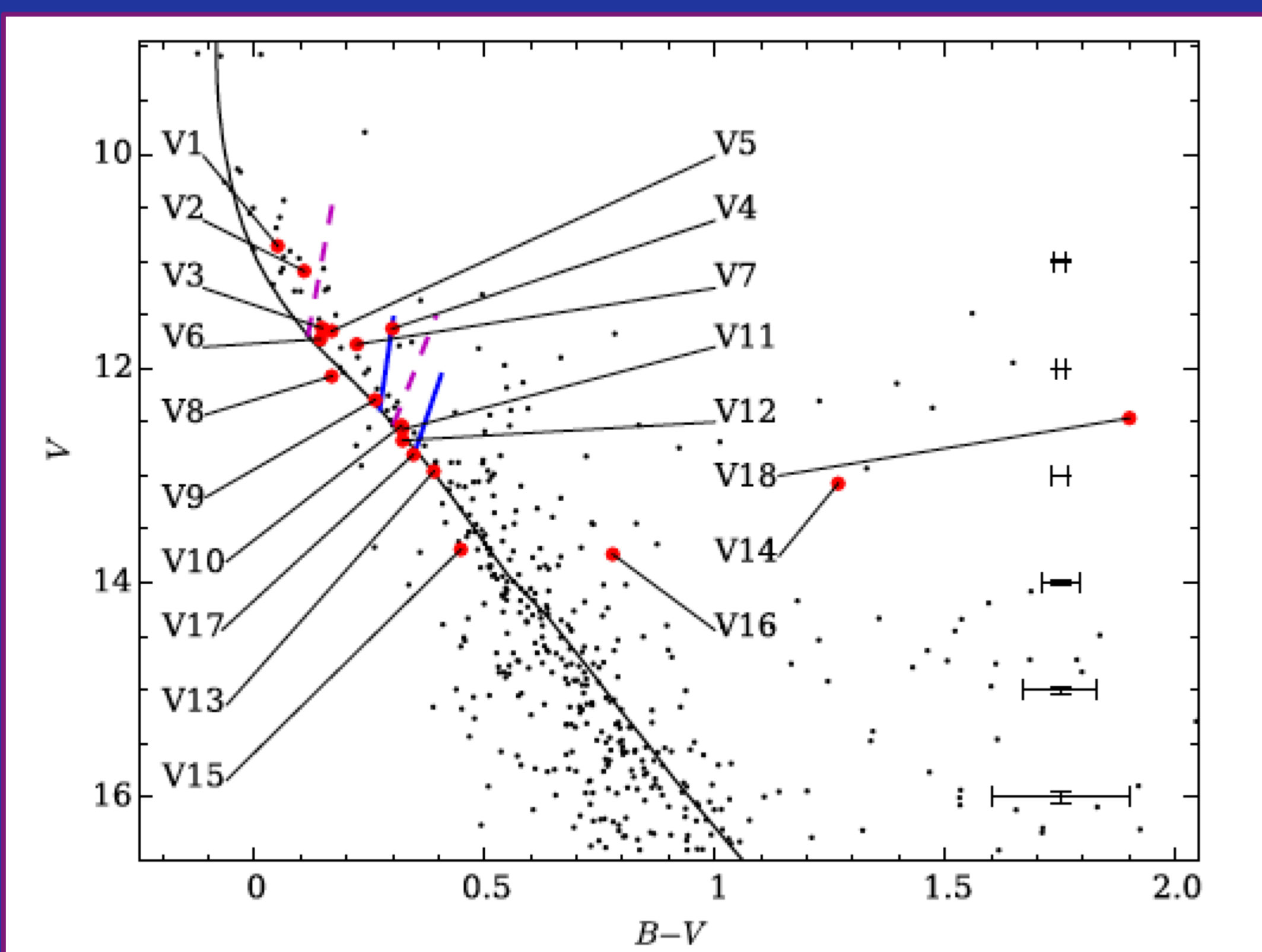
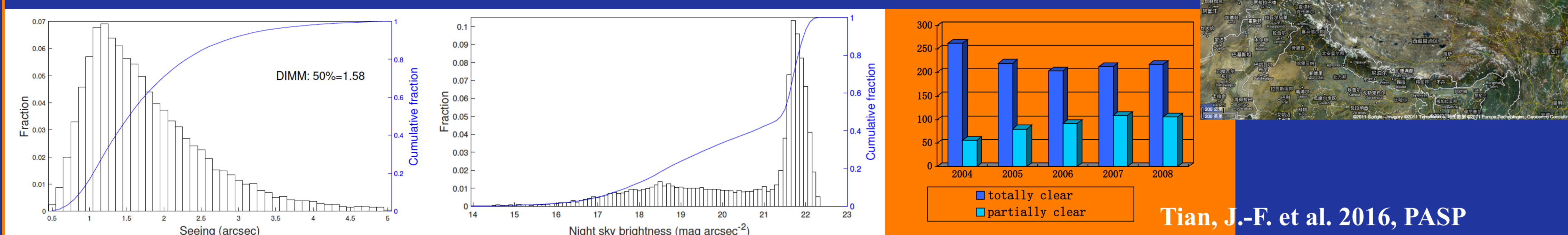
1. Photometry of a sample of open clusters, determining basic physical parameters measured in a uniform way;
2. Time domain study of variable objects in selected clusters: long time based line, high cadence and high duty cycle, high precision photometric observations;
 - A complete survey of stellar variabilities along the main sequence (β Cep, δ Scu & γ Dor etc.....) in selected open clusters;
 - A complete survey of small and large amplitude red variables along the RGBs of selected open clusters;
 - A complete survey of eclipsing binaries in selected clusters;
 - Looking for transit of exoplanet systems;
 - Looking for flare type variabilities in selected clusters;
 - Stellar rotation and spots activities;
3. Time domain study of selected field areas.



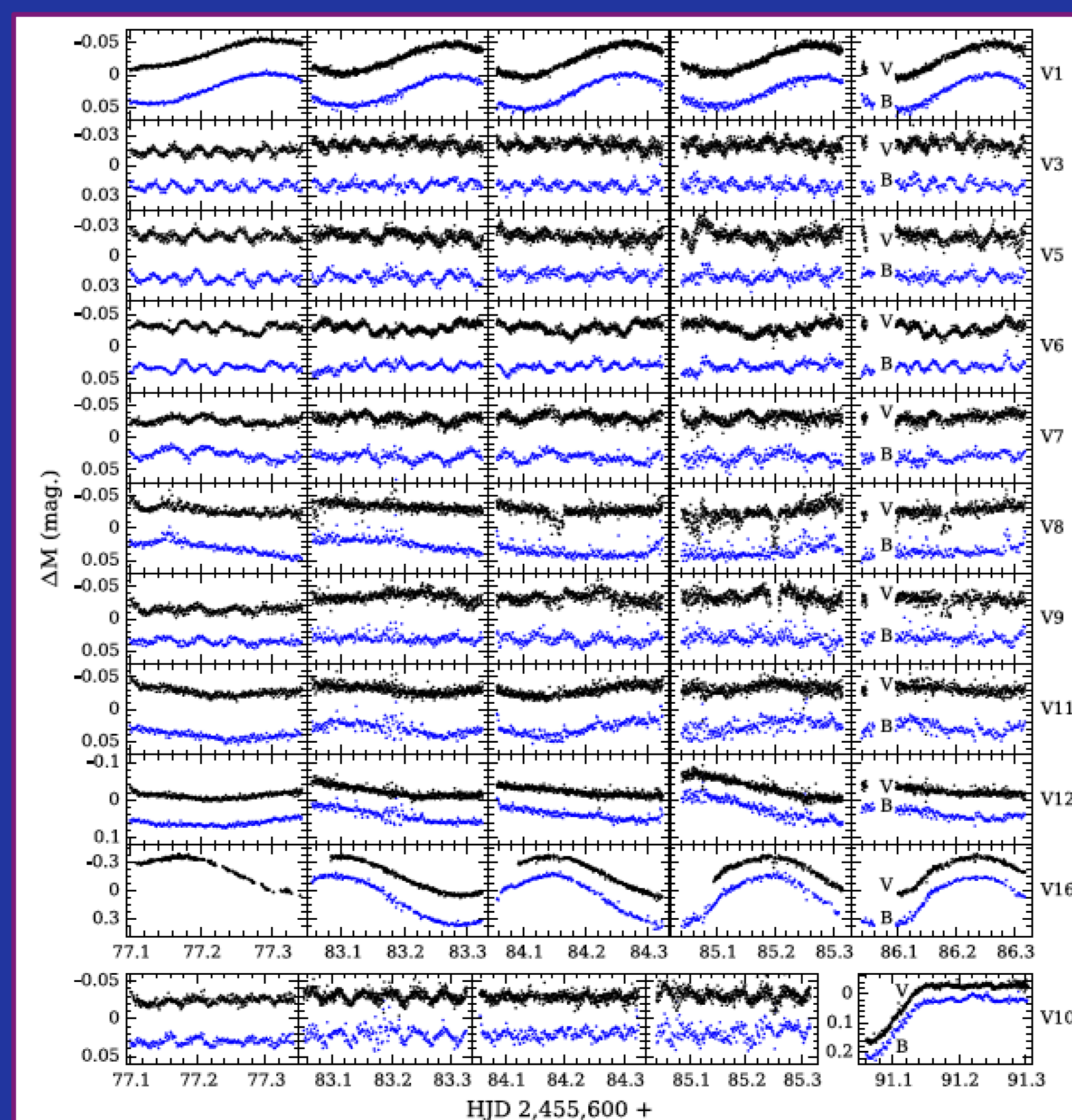
50BiN's prototype node was fully funded by China-West Normal University (CWNU). It is the first instrument running at the Chinese SONG node. After the first-light in 2013, 18 open clusters were observed at least in two bands (usually B, V) in time-series. The data collected so far has been processed by our photometry pipeline. The data statistics are given in the table

Targets	No. Nights	No. Frames (B,V)
NGC 2099	46	6923, 15901
NGC 2301	40	9490, 20155
NGC 188	40	6195(V), 3586(R), 5904(I)
NGC 2862	37	5091, 12601
NGC 7789	35	4705, 9168
NGC 6811	33	6368, 12364
NGC 744	29	6255, 11563
NGC 1664	26	6562, 9488
NGC 869	24	5254, 10123
NGC 1342	22	2175, 3986
NGC 663	10	3392, 8059
NGC 2169	4	1046, 1368
NGC 2281	4	500, 854
NGC 1960	3	733, 1263
NGC 3231	3	229, 450
NGC 2224	2	282, 554
NGC 2395	2	376, 716
NGC 7235	2	171, 326

Delingha: the Site of the project (Geographic location: N37.378027 E97.732326)



CMD of NGC 2301 with the positions of variables marked. The black solid line represents Padova isochrone. The magenta dashed lines and blue solid lines are the borders of the instability strips for δ Scuti (Breger 1979) and γ Dor stars (Handler 1999), respectively. See Wang, K. et al. 2015, AJ for more details.



A discovery of 10 new variable stars in NGC 2301 including δ Scuti stars with amplitudes of a few percent magnitude, milli-mag photometric accuracy is achieved. See Wang, K. et al. 2015, AJ for more details.

	5<D<60	5<D<40	5<D<30	5<D<20
(m-M)v<16	447	423	399	324
(m-M)v<15	431	407	389	310
(m-M)v<14	405	381	357	287
(m-M)v<13	355	331	309	243
(m-M)v<12	319	295	273	216
(m-M)v<11	275	253	232	183

Number counts by diameter and DM of the visible open clusters ($\delta > -10^\circ$) on 50BiN site.

